

Scotland's food systems – the contribution of local production



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Executive summary

Background

Historically, the main food policy driver was to grow the production base (i.e., through agriculture). However, as awareness of the importance of nutrition and of food safety has grown, the link between what we eat and its impact on human health has grown. At the same time, the impacts of production methods on the environment have been increasingly recognised. From these developments, new areas of government responsibility have evolved. The food system (from production through to consumption) is now regulated by policies spanning multiple government and local authority departments. The Scottish Government (SG) has recognised this in its development of the Good Food Nation Act (GFNA). The Act places responsibility on Scottish Ministers to prepare and publish a national good food nation plan and to require certain authorities to prepare and publish their own good food nation plans.

The Scottish Science Advisory Council (SSAC) is an advisory body independent of government. Recognising the complexity of food systems and the potential for unintended consequences between policies, the SSAC offered to undertake a review of relevant evidence. The scope of the study was agreed at inception with policy officials in the Food and Drink Division. It builds on the analysis of the Scottish Government consultation on local food¹, which was published in July 2022. Building on the views expressed in the consultation, the study used readily available examples of good practice and evidence from the scientific literature to explore the use of innovations and their impacts in local food production systems.

Approach

We sought the views of stakeholders via a questionnaire ([Annex A](#)), supplemented by a virtual roundtable ([Annexes B, C and D](#)) bringing together respondents and additional stakeholders (collectively representing local and national government and the third sector) with academic experts. The definition of local production² used in all correspondence was taken from the one used by the SG. The questionnaire and roundtable discussions focused on three themes:

- i. innovations to stimulate local production;
- ii. innovations in the social and policy environment to facilitate local production; and
- iii. consideration of the health, social, and economic aspects of local food production which could inform both the implementation of the GFNA and the development of other food policies with a local focus. The outputs from the questionnaire and roundtable stages were used to focus the in-depth review of good practice and evidence from the scientific literature.

Context

Scotland's geographical diversity is well documented in relation to local food production (e.g. types of produce, access to affordable energy) due to differences in environmental and infrastructural conditions and connectedness. Thus, the GFNA places a responsibility on 'relevant authorities'³ at a local level to develop GFN plans which must have regard to the national GFN plan. Both national and local plans must also have regard to the scope for food-related issues to affect outcomes in relation to a range of issues.

¹ [Executive Summary – Local food for everyone: consultation analysis – gov.scot \(www.gov.scot\)](#)

² Local food production is defined by the SG as food that has some or all of the following features: it is produced locally (this includes your, town, region or elsewhere in the rest of Scotland) and it has short supply chains (there are fewer steps than global and imported food between the primary producer of the food and the person who eats the food; this could include a farm supplying a local shop or supermarket).

³ A health board, a local authority or a public authority specified by the Scottish Ministers in regulations.

This includes, *inter alia*, social and economic well-being, the environment, health, and physical and mental wellbeing, economic development, animal welfare, education, and child poverty. This requires an engagement across sectors and the examples of innovations included in [Annex E](#) were selected to help address the challenges which this imposes.

Development of both national and local plans must include a consultation stage which has 'regard to the importance of communicating in an inclusive way that is effective in engaging children and young people'. Inclusive and representative community engagement is a challenge, as highlighted in a recent SSAC report⁴ on aquaculture, which recommended formally engaging social scientists in the process.

Insights and suggestions

Below, we highlight some key insights and suggestions to SG on potential advantages and barriers to adoption of food system innovations (which will differ in importance according to the priority challenges in local areas). These are structured around the original three themes in the questionnaire and roundtable and have focused predominantly, but not solely, on terrestrial production systems (i.e. excluding fisheries and aquaculture). Environmental themes have not been addressed explicitly in this report since they have been well covered in other reports, although it should be recognised that many of the innovations reflect the need of food production to adapt to climate change. The three themes were chosen to highlight the importance of considering the consequences of the adoption of system innovations on other sectors of the community beyond local producers. Further details of the innovations are available in the relevant Tables in [Annex E](#).

Examples of innovations in biology, processing, and supply chains (p 16 Annex E):

Production of novel proteins is being researched in Scotland but is currently small-scale. This adds cost in terms of processing infrastructure and establishing supply chains and may result in consumer resistance. Vertical farms have been a well-advertised innovation for producing fresh vegetables to remote communities; however, price and environmental comparisons with greenhouses and polytunnels were not available. On processing and supply chains, the low (compared to European countries) participation of Scottish farmers in co-operatives was highlighted. Accelerating the adoption of innovations would benefit from growers and producers, processors and retailers (local and national), and local authorities and government working together – as well as being responsive to potential changes in consumer attitudes and expectations. Collaboration and engagement are essential to support scalability of both supply and demand. The targeting of government financial support towards co-operatives rather than individuals might be an incentive for greater collaboration.

Examples of social and policy innovations (p 31 Annex E):

Community gardens and allotments have the potential to contribute to health and well-being and the availability of affordable food in urban settings. However, they are unlikely to scale to support a large part of the population. At the same time, the contribution of local procurement and farm shops in rural areas to local economies (beyond just local producers) should be recognised (due to 'imports' of many products from outside the local area) – although comprehensive data on what is sold in 'farm shops' is lacking. Increasing local procurement is a challenge in Scotland due to both the seasonality of production and constraints on public sector budgets for procurement for schools and hospitals, for instance. There are examples of success of local procurement, but it was not possible to identify the origins of the supply. Food safety regulation appears as a barrier to local producers, yet regulation of the food industry is vital for health and well-being. Increasing the number of small producers and processors increases the burden on local authorities.

⁴[SSAC Aquaculture Report – Use of Science and Evidence in Aquaculture Consenting and the Sustainable Development of Scottish Aquaculture.pdf \(scottishscience.org.uk\)](#)

Nutrition, health, and economic benefits:

The nutritional benefits of foods depend not only on the nutritive value of individual food items but also on the wider composition of diets within which they are consumed. Anecdotal evidence suggests that 'local' food is more nutritious (and hence healthier) because it should, by definition, be fresher; however, scientific reports advise against making that generic assumption. What is on offer in local shops will influence what is purchased, which in turn will affect dietary choices. Nutrition considerations are embedded in the analysis of innovations. Local production and retail may have an important role to play in improving Scottish diets, but a better understanding of what food is sold outside supermarkets may be an important first step.

The main report which follows contains a more detailed consideration of the supporting evidence drawing out potential actions for other stakeholders. It includes links to examples of good practice which could be useful to those charged with developing Good Food Nation plans.

1. Introduction and scope

The main aim of this SSAC report is to summarise the scientific evidence which could inform the opportunities and risks of increasing local production and its contribution to Scottish food systems and to highlight barriers to scaling up that contribution. The scope of the work⁵ was agreed with policy officials from the Scottish Government's (SG) Food and Drink Division and should therefore be closely aligned to SG policy on food, including the GFNA. The plans prescribed by the GFNA will be wide ranging and crosscutting, taking into account a wide range of food-related issues that contribute to social and economic wellbeing, the environment, people's health and physical and mental wellbeing, economic development, animal welfare, education, and child poverty. The Act also lays out a set of high-level principles that should be used when preparing the Good Food Nation Plans.

SSAC adopted a systematic approach to explore the opportunities and challenges of developing local food production systems along with an appreciation of unintended consequences this might bring. We have used definitions of food systems and local production from United Nations Environment Programme (UNEP) and SG as follows:

“the food system can be defined as the complete set of people, institutions, activities, processes, and infrastructure involved in producing and consuming food for a given population. This covers all stages of the value chain – from growing and harvesting agricultural products through to processing, packaging, transporting, selling, cooking, consuming, and the disposal of waste food and packaging.” (UNEP⁶ 2016)

Local food production is defined as food that has some or all of the following features:

- 'it is produced locally (this includes your, town, region or elsewhere in the rest of Scotland);
- it has short supply chains (there are fewer steps than global and imported food between the primary producer of the food and the person who eats the food, this could include a farm supplying a local shop or supermarket).'

During the course of the SSAC study, it became increasingly clear that, since local production is only one part of a food system and the relative benefits (and beneficiaries) of investing in that part of a system vary between different locations, investing in other local food-related activities may be equally important. The language around 'local food' thus needs to be clear as to whether the intended beneficiaries of incentivising the growth of its contribution to Scottish food systems are local producers, local consumers, the local economy or a broader range of beneficiaries.

1.1 Methods

Experts from a range of academic disciplines were invited to join SSAC colleagues in forming a Working Group to conduct this study. The Working Group agreed the structure of a questionnaire, which was circulated to stakeholders ([Annex A](#)). The responses informed the format for a roundtable, which comprised of key stakeholders from across the third sector, academia, and public sector agencies. This sought to develop deeper insights to the challenges and opportunities ahead ([Annex B](#)). Finally, to establish an overview of existing activities and plans towards local food production and innovations, an in-depth study of good practice and evidence from the scientific literature was conducted ([Annex E](#)). The contents of this main report were agreed by the SSAC as a whole.

⁵ [SSAC Food Systems Scoping Agreement – updated 25 April 2023.pdf \(scottishscience.org.uk\)](#)

⁶ UNEP 2016 [Food Systems and Natural Resources | Resource Panel](#)

2. Background and policy context

2.1 The Good Food Nation

Much work is being carried out to achieve the aim of Scotland becoming a Good Food Nation as set out in the GFNA which was passed by Parliament in 2022. The GFNA places duties on Scottish Ministers to produce a national GFN plan.

The GFN vision is that:

- 'everyone in Scotland has ready access to the healthy, nutritious food they need; dietary-related diseases are in decline, as is the environmental impact of our food consumption;
- Scottish producers ensure that what they produce is increasingly healthy and environmentally sound;
- food companies are a thriving feature of the economy and places where people want to work.

The Act may (in future) also require "certain authorities"³ to prepare and publish their own good food nation plans. Distinct but related to the Good Food Nation, the SG has also committed (in the SNP 2021 Manifesto) to develop a local food strategy.'

2.2 Local food for everyone

The three pillars of the Scottish Government's local food strategy are: connecting people with food; connecting Scottish producers with buyers; and harnessing public sector procurement. A consultation on Local Food for everyone in 2021⁷ showed broad support for these three pillars. It also identified several barriers, including *inter alia*:

- 'lack of a suitable infrastructure and short supply chains.
- local food to be affordable and accessible to all, with a Right to Food embodied in local food policies. It was felt by some that the pandemic has served to expose dysfunctions in the current food system. More land to be made available and accessible for those who wish to enter the market.
- financial support and investment, including agricultural subsidy reform.
- changes to procurement processes and the introduction of Dynamic Purchasing Systems; extending public sector procurement for local food to all publicly owned settings; also for central and local government to set an example by ensuring local food is procured.
- a comprehensive, holistic and interdisciplinary approach across all relevant policy areas, particularly in relation to the environment; and policy interventions as aids for prioritising local food.
- higher levels of partnership working and co-operation.
- clear food labelling, for example, using a traffic light system for CO2 emissions, so that the provenance of food is highlighted and consumers can identify food that is truly local.
- a clear definition of sustainable.
- education and awareness raising of the benefits of local food as well as encouraging consumers to eat seasonal food.
- reductions in food waste and use of packaging.'

It was against the backdrop of this work, that the SSAC undertook its review of the evidence (from best practice and the scientific literature) of the opportunities and risks associated with specific innovations, for different beneficiaries.

⁷ [Local food for everyone: consultation analysis](#)

3. Summary of the synthesis of evidence

Detailed reports of the questionnaire responses and the roundtable discussion are presented in [Annexes C](#) and [E](#). In the following sections, we provide the main summary points that informed the findings.

3.1 Summary of questionnaire responses:

The questionnaire contained eleven questions structured in three sections: innovation and use of new technology and data to support (local) primary production through to food production; innovative (local/central) government policies to support (local) food production and health; and social and economic aspects of local food production. There was a specific focus on seeking comments on opportunities and barriers in the questions.

Some common themes and examples were apparent in the responses ([Annex E](#)), focused around innovations (social (e.g. support for co-operatives) and technological (e.g. vertical farms, coupling of renewable energy to food production) and general food culture (e.g. nutrition, affordability)) and these were used to help identify key questions to be discussed with stakeholders in the roundtable and to inform the subsequent focused literature review.

3.2 Summary of roundtable discussion:

Prior to the roundtable, two sets of questions were devised. The first set focused on 'Innovation in local food production'. The second focused on 'Consumption, nutrition and acceptability'. With regards to the former, the conversations centred around two different strands of innovation: one based around the production-side technological innovation, and the other relating to social innovations are at [Annexes C](#) and [D](#). [Annex B](#) contains the discussion notes from the different break-out groups and the opening presentations. A brief summary is given in the following sections.

3.2.1 Technological innovation

There were clear views that place and community need to be considered when innovating in local food systems. At the same time, opportunities and the case for change were acknowledged. However, technology-based innovation is not enough and requires coupling with institutional innovation, as well as social and behavioural change.

A recurring topic on the production side was the potential economic benefits of secondary production and processing facilities for Scotland's small producers. There was agreement that there is a general lack of infrastructure and that enabling producers to gain improved access to processing facilities in their local area would be of benefit. This underlined the importance of place-based strategies to take advantage of innovations. Innovations identified included community greenhouses, vertical farming, utilisation of renewable energy, and anaerobic digesters, improvement in the use of data (which needs to be shared) to improve efficiencies and reduce waste. Barriers to their uptake included lack of access to finance, with the need for place-based and regional business models to encourage innovation in utilising renewable and surplus energy being particularly emphasised. It was also recognised that spatially granular data on local food production and contributions were often lacking.

3.2.2 Social and policy innovations

It was noted that rural food systems require innovation in land ownership – including community ownership and different legal frameworks to improve land access. In urban settings as development planning is undertaken, there should be consideration of the availability and provision of land. The relationships with local authorities are key to local systemic change. Food innovation hubs are needed, encouraging relationships between food and drink small and medium-sized enterprises (SMEs) and local authorities. Shared infrastructure, such as community green houses, are needed.

A recurring point was that 'one size does not fit all', reflecting different place-based requirements. Overall, throughout the discussion, participants were in favour of localised and place-based food system planning and the importance of local authorities playing more of a role in their local area regarding food systems. One participant said: 'The more localised the food plan the better.' There were also calls for [National Planning Framework 4](#) to be used in integrating food production into town and city planning.

3.2.3 Consumption, nutrition, and acceptability

Discussion centred around how small-scale local production schemes (e.g. allotment schemes, urban growing, school schemes) bring multiple health benefits including mental, physical health and wellbeing, social interactions and developing a skill base. However, there is limited evidence to show that locally produced food improves diet. There remain challenges in matching what is being produced with which food products people in Scotland actually want to eat and what societal changes would be needed to drive shifts in Scottish diets. Examples were provided around educational programmes and school projects – particularly the Scotland-wide [Seafood in Schools](#) program – which can help encourage healthier dietary choices and inform consumers.

Local food production and consumption bring opportunities to share knowledge in relation to growing and food preparation. Community efforts may also lead to reduced waste.

The prices which small producers often have to charge to be financially viable to operate were discussed as a barrier to the general affordability (particularly of healthy dietary choices) and accessibility of local foods from small-scale producers. An example was given of a [Food Hub in Dumfries & Galloway](#) composed of small-scale producers in the surrounding local area. This was not deemed financially accessible to all consumers. To make it financially viable for the small network of producers meant it was extremely difficult to make it affordable. Higher costs (e.g. in energy), and smaller volumes of goods mean that local producers may be excluded from some markets.

Priority actions identified included investment in infrastructure, with the lack of processing facilities being an issue. It was suggested that there was a need to grow the independent and alternative retail market to improve route-to-market for small-scale producers.

3.3 Literature synthesis:

Following the evidence collected from both the questionnaires and roundtable, a focused literature and internet search was conducted to source evidence of some of the features of local context which might enhance opportunities or raise barriers. The full report is in [Annex E](#).

3.3.1 Innovation

Following the literature and evidence synthesis, innovations were categorised into four groups: technology; biology; processing and supply chain; and social and policy. Annex E, section 4 provides a detailed summary of the identified innovations including hyperlinks to specific examples. These case studies include examples from within Scotland's food system detailing innovative practices which already exist, alongside international case studies which provide novel innovations which may not be currently present in Scotland. Initiatives which could support the proposed innovations are identified.

In summary, **technological innovations** (Annex E, section 4.1) were mainly focused round vertical and roof-top farming and the use of energy. It quickly becomes clear that the potential benefits from such innovations are different whether in an urban or rural setting. This underscores how local place-based appropriate innovation must be considered. Scotland has excellent examples of local food businesses making use of innovative vertical farming and energy technologies. ([IGS – Invergowrie](#), [Achiltibuie hydroponium – Ullapool](#), [Mackie's Ice Cream – Aberdeenshire](#)).

Glasshouse production, and in particular greenhouses making use of waste energy streams was one further area identified as underutilised within Scotland. One example includes the innovative heating system employed at Castleton Farm, Laurencekirk that allows them to extend the growing season with waste products from the farm.

Biological innovations (Annex E, section 4.2) were identified but did not specifically target local food production. Nevertheless, many could be applicable at local scale and certainly at national. They include examples of plant breeding and genetics ([James Hutton Institute – Dundee](#)), and the aquaculture sector within Scotland ([MARA seaweed – Edinburgh](#)).

Processing and supply chain innovations (Annex E, section 4.3). Several themes were identified including the development of a network of processing facilities (including on-farm processing ([Rora Dairy – Peterhead](#)) and in the development and operation of short/local supply chains. Co-operation in infrastructure focuses on arrangements among those that produce and market farm products. Discussion of abattoirs has consistently appeared in our evidence and innovations such as Bowhouse and Balgove ([Western Isles Council Abattoir – Stornoway, Lewis](#)) have shown that producer-owned slaughtering facilities can provide a solution for small levels of livestock throughput from farmers in local areas. However, a Scottish Government report from 2020 highlighted the significant level of investment required, alongside payback times for different models. Finally the development of new wholesaler relations (including co-operatives through to supermarket chains ([Mossgiel Dairy & Baxter Storey](#) and [Highland Wholefoods Co-operative – Inverness](#)) were highlighted. Co-ordination between producers can involve pooling or consolidation among individuals and companies from the same level of the food chain. Vertical co-ordination includes contracting, strategic alliances, and licensing agreements with market stages in different levels of the food chain, including the large supermarket chains ([Asda, Supplier Development, Scotland](#)). The role of local, independent retailers was also identified as an area for further innovation ([Locavore, Glasgow](#).)

Social and policy innovations (Annex E, section 4.4) was the final category considered. A growing body of research⁸ highlights that social innovation has a particularly important role to play in transforming food systems. Social innovations include those related to shorter food supply chains, community-supported agriculture, urban farming, plant-based nutrition, public procurement schemes, food waste solutions, food education, and community-building initiatives. A diversity of topics and innovations identified in the SSAC synthesis supported the importance of social innovation and included developments in linked urban farming and town planning ([Lauriston Agroecology Farm – Edinburgh](#)), encouragement to new entrants to food production, and critically the role of local authorities ([Glasgow City Food Plan](#)). Supporting local food production in rural and island communities was a theme identified, emphasising again the importance of respecting the place-based challenges and individual opportunities ([Transition Turriefield – Shetland](#)). Increasing procurement of locally produced food is seen as one stimulus for local production. Public sector procurement can have a powerful influence over local producers, processors, and wholesalers since it represents a source of demand which is consistent, stable, and predictable, but seasonality of production presents a challenge ([Mossgiel Milk and East Ayrshire Council](#)). Social innovations include the development of educational levers to shift behaviours and change dietary preferences ([‘Eat them to defeat them’ campaign. The discussion around regulation](#)). Innovative, targeted finance can improve financial inclusion in agriculture, by fostering lending to specific projects such as community-led enterprises – driving growth in local food systems.

3.3.2 Nutrition, health and economic benefits

The third topic which featured in questionnaires, roundtable and evidence synthesis related to some of the benefits of local food production. Frequently presented as one of the key drivers for growth in local food production, the nutritional benefits of foods consumed depend on the nutritive value of

⁸ e.g. IPES-Food, 2019; SAPEA, 2020.

individual food items. Losses in the nutritive value may occur between production and consumption (i.e. during distribution, processing and food preparation such as cooking) and the ultimate nutritional benefit also depends on the combination of foods selected by the consumer. There are perceptions that 'local' food must be more nutritious (and hence healthier) because it should, by definition, be fresher, but scientific reports⁹ advise against making that generic assumption. However, there are minimal data on the volumes of different types of food sold via farm shops, farmers' markets and vegetable boxes for example. One report from 2022¹⁰ does demonstrate a very significant contribution to the economy £1.4 billion annually at UK level.

Short supply chains (sometimes referred to as Alternative Food Networks or AFNs) may indirectly contribute to healthier consumption through an influence on food products purchased by consumers. AFNs¹¹ are considered to include farmers' markets, community supported agriculture (CSA), box schemes, collective farmer shops (CFSs), producer co-operatives, organic clusters, and community gardens. These may have started by focusing on, for instance, fruits and vegetables produced locally – but factors such as seasonality of supply limiting products on sale may encourage diversification into a wider range of products. This often includes some ultra-processed products to meet customer demand and support economic sustainability which are increasingly being associated with negative health outcomes¹².

There is an increasing body of research on AFNs at a European level. However, a lack of research on how the proposed growth of local food production and marketing in Scotland is impacting on our major challenge of poor nutrition.

3.3.3 Use of the term 'local food'

There are numerous definitions of what is meant by local production and there is a risk that the phrase suggests the main beneficiaries are local producers, but from a local food system perspective, there is a wider group of beneficiaries, including retailers and consumers. The initial stakeholder feedback highlighted issues of affordability of locally produced food, which is likely to be true in a rural setting (although data are scarce) but some examples, given above, illustrate economic and well-being benefits in urban settings. The term 'local food' carries other connotations too: it is about social proximity, local food is understood to represent a relationship, not simply a commodity, and the way local food is bought and sold preserves the meaning and story of the food and suggests trust between the producer and the consumer (or 'co-producer' or citizen). Local food is typically unprocessed or minimally processed, with no 'hidden ingredients', and is produced on a human, not industrial, scale. The charity Nourish (who undertook the analysis of the SG consultation on local food) in 2014 stated they prefer to use the term 'short food chains' rather than 'local food'¹³. In light of recent reports of potential health issues associated with ultra-processed foods¹² changing the language to reflect the absence of added chemicals may be an added tool in enhancing healthier eating behaviour.

⁹ [Nutrition and Cost Comparisons of Select Canned, Frozen, and Fresh Fruits and Vegetables – Steven R. Miller, William A. Knudson, 2014 \(sagepub.com\)](#) and Rickman et al, 2007 Nutritional comparison of fresh, frozen and canned fruits and vegetables. Part 1. Vitamins C and B and phenolic compounds. J. Sci. Food Agric. 87, 930-944. <https://doi.org/10.1002/jsfa.2825>

¹⁰ [News – New Harper Adams research demonstrating £1.4 billion annual sales impact of Britain's farm shops revealed | Harper Adams University \(harper-adams.ac.uk\)](#)

¹¹ Kessari et al, 2020 Alternative food networks: good practices for sustainable performance, Journal of Marketing Management, 36:15-16, 1417-1446, DOI: [10.1080/0267257X.2020.1783348](https://doi.org/10.1080/0267257X.2020.1783348)

¹² Pagliai et al (2021). [Consumption of ultra-processed foods and health status: a systematic review and meta-analysis – PubMed \(nih.gov\)](#)

¹³ [Local-Food-Economy-Report.pdf \(nourishscotland.org\)](#)

During and post pandemic, the dialogue concerning food security and food system resilience brought local food to the forefront. A recent report from the University of Gloucestershire¹⁴ noted that there are significant differences between the local food movement group and mainstream food system group in the way local food is framed, understood, and imagined as a pathway for systemic food system resilience and security. For the local food movement group, re-localising food supply chains should be a central part of an improved UK food system, a means to provide multi-benefit solutions (sustainable, fair, etc.), and build capacity for resilience. Recommendations from local food movement bodies focused on supporting local food initiatives and shortening supply chains through funding, infrastructure, and skills support.

4. Overall summary

4.1 General findings:

In the development of food plans at both the national and more specifically local levels, it is important to have a place-based focus. This is particularly important considering the heterogeneity across the Scottish mainland and islands.

However, there remains a need for a **different approach to the use of the word local**, given different expected benefits in different contexts. This is important in terms of monitoring and evaluating the impacts of food plans. The lack of existing data on AFNs also presents challenges in drawing interpretations. The need for better defined data/ digital systems to fully measure and account for the contribution of local food production is required. That would enable local food strategies to consider a range of benefits to a range of beneficiaries, and also confirm whether AFNs with their shorter supply chains can help to avoid the health dangers of additives during processing.

There is a clear need for **support to encourage further co-operation and collaboration** for production at a local level to operate at scale. This includes bringing together producers, processors, retailers (including supermarkets), local authorities, and central government.

There are many different local food system innovations already occurring in Scotland and beyond. However, many require some further degree of financial support and awareness of experiences elsewhere to overcome potential barriers and challenges – especially if they are to operate at scale. This includes **development of innovative finance and business models** to allow local producers and processors to thrive (see p 39, Annex E for further details). An extremely powerful tool in the adoption of technological innovations is effective knowledge transfer and actors sharing best practices.

4.2 Findings on innovation

We have tensioned the findings from the questionnaire and roundtable against the literature and synthesised the evidence around innovations into the following categories: technological, biological, processing and supply chain, and social and policy. Full details can be found in Annex E section 4. In summary, our findings and recommendations are:

a. Technology (section 4.1, Annex E) –

- i. Diversification of different innovative growing methods such as vertical farming and more greenhouse/glasshouse (heated from surplus/renewable energy sources) were seen as areas rich for development.

¹⁴ [10941-Black-et al-2022-How-is-local-food-framed.pdf \(glos.ac.uk\)](#)

- ii. Access to and the use of surplus and renewable energy technologies, as well as improving access to secondary production and processing facilities for small producers, were seen as key challenges.

Successful developments here will require greater cross-sector working in food and energy, alongside financial support and investment in the necessary technologies.

b. Biology (section 4.2, Annex E)

- i. Innovative breeding and new forms of protein production present opportunities for increased production. Nevertheless, economic challenges of scaling up, and consumer acceptance, need to be considered early. Moreover, breeding for production in vertical farming would enlarge the scope of what can be grown.

c. Processing and supply chain (section 4.3, Annex E)

- i. Investment in and development of local infrastructure that can be shared across small scale producers, including on-farm processing, could help with the economics of scaling up. Co-operation and collaboration in such local infrastructure was identified as key.
- ii. Support in developing and operation of procurement processes which support local producers' participation. This includes greater engagement across retailers, from on-farm to major supermarket chains, and in building alternative supply chains.
- iii. Creation of mechanisms to support the development of a network of collaborative enterprises.

d. Social and policy (section 4.4, Annex E)

- i. The role of local authorities was identified as critical, including in improving and encouraging growth in their local food system, and (in some contexts) improvements to access to land for local food production. Town planners could consider how to incorporate more urban growing spaces. Each GFN plan composed by local authorities should specifically address local challenges and play on localised strengths. The varying food systems across Scotland present their own unique challenges and hence will benefit from different measures.
- ii. More urban growing spaces do not by themselves guarantee healthier, more nutritious diets. Nonetheless, they bring additional wellbeing benefits around use of green space and physical activity. They will also contribute to changing dietary preferences, and changes in behaviours; e.g., less-processed foods and more individual dietary and cooking choices – with nutritional and health benefits.
- iii. Co-operative structures may provide a greater opportunity for longer-term viability of smaller food businesses. Public bodies and co-operative support agencies may be able to help drive more co-operative-focused shorter supply chains encouraging the formation of more Scottish co-operatives, as well as strengthening market position.
- iv. An increased uptake of value-added agriculture and on-farm processing may help achieve the aims of driving prosperity within the food and drink industry as laid out in the GFNA.
- v. Suitable business support to help with market research, product development, and effective marketing strategies should be readily accessible to help encourage Scottish producers.
- vi. Processing facilities and infrastructure are key in bringing local producers' products to market.
- vii. Reliable and stable access to markets will strengthen Scottish producers' ability to innovate and invest in infrastructure.

Finally, our analysis suggests increasing pressure on local authorities to enhance cross-sectoral planning – not only for food, but other issues such as climate change mitigation and adaptation.

This is at a time when they are already suffering from tight budget allocations and have less access to scientific advice than central government, yet they are in the best position to prioritise local needs.

Many researchers interested in providing evidence for policy focus primarily on central government.

There could be potential mutual benefits of strengthening research partnerships with local government but different mechanisms to encourage and support such partnerships are needed.

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scottishscience@gov.scot